

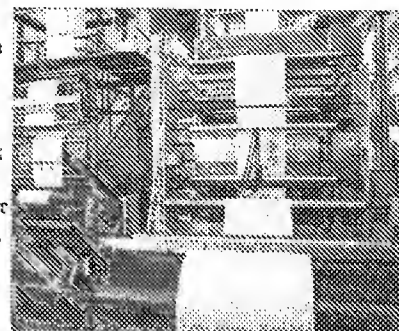


Plastic Co-Extrusion

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Coextrusion is the process of pressing two or more materials through the same die to produce a single piece. When multiple plastics are combined, the result can yield properties distinct from those of a single material. Coextrusion has opened up new frontiers in material engineering and addressed several previously difficult manufacturing needs.

Coextruding a stripe of radiopaque plastic into a catheter, for example, improves x-ray quality as the catheter moves through a vein without compromising the effectiveness of the catheter itself. Coextrusion can also reduce costs by using recycled and reground scrap inside virgin material for handrails, fences and other applications. The process can be seen in projects as diverse as tubing and structural components or air blown food containers.



The Coextrusion Process

In standard extrusion, solid plastic pellets are gravity fed into a forming mechanism, where jacketed compression screws melt and feed the materials into a die. By contrast, coextrusion involves multiple extruders forming layered or encapsulated parts. Sometimes five or more materials are used in a single cycle, with each extruder delivering the precise amount of molten plastic needed for the operation.

Unlike ordinary plastic mixing, each individual plastic retains its original properties, but is combined into a compound-material part. If mixed prior to extrusion, the characteristics of the individual materials may be altered, but the end result is a homogeneous product.

Not all plastics are suitable for coextrusion because some polymers will not adhere to others, although introducing a conductive middle layer can often solve this problem. Plastics with drastically different melting temperatures are also unsuitable for the process, as degradation will occur in the lower melting material. Finally, PVC and acetals should never be coextruded together because of the potentially violent reactions that can occur when they are joined.

Coextruded Tubing

The multi-colored drinking straw is a good example of coextruded tubing's design features. Striped tubing also serves many purposes in the medical field, in which stripes and colors can denote different chemicals. Coextrusion can produce internally hardened tubes through which a cable can be run while retaining the tube's flexibility. Other tubes benefit from a high performance liner (impervious to corrosives, or an inexpensive coating to add bulk and stability). In addition, plastic fiber optic cables are composed of a coextruded cable and jacket.

Coextruded Structural Units

Plastic is sometimes used as a substitute for wood. Manufacturers can create decking, boat docks, fences and dimensional components with "plastic lumber," which has some advantages over natural wood. Coextrusion is a cost-effective method of fabricating many of these artificial materials. It can add titanium dioxide, a weather resistant material, to exterior structural plastics or produce decking with an inner layer of recycled plastic.

Blow Molding

In blow molding, plastic is extruded into tubes that are cut to length and partially formed in molds. Pressurized air then forces these pieces into a cavity that shapes the material into its final form. Blow molded products, such as bottles, are commonly used in the food and cosmetics industries. In order to increase a product's shelf life, a barrier layer is coextruded into the plastic to prevent the container from leaching gases, aromas and moisture. Breweries also use coextruded plastics for beer products because their non-porous properties approach those of glass and aluminum.

The energy industry employs coextrusion to help meet certain emission standards. Ethylene Vinyl Alcohol (EVOH) is coextruded with various polyethylenes to produce vapor-proof fuel tanks that meet environmental requirements. Surprisingly, EVOH is also an all-purpose barrier material used in mayonnaise, ketchup and baby food bottles. Although listed as food grade, it is usually sandwiched between two layers of substrate. Transparent containers for vitamins and pharmaceuticals are also made with coextruded EVOH.

Sheet Materials

Manufacturers coextrude polycarbonate and acrylic sheeting to form UV and infrared barriers that reflect harmful rays while allowing visible light to pass through. These coextruded sheets are resistant to deterioration from light exposure, and do not yellow with time. An abrasion-resistant film may also be coextruded onto the sheet's surface to further protect it from erosion.

The Future of Coextrusion

Although compound plastic products have already found multiple applications in the medical, food, and energy industries, coextrusion continues to expand its functional range. Since the effectiveness of its products depends on the combination of plastics used in the process, discovering viable mixtures will shape coextrusion applications in the future.

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